

A DAY AT CHRISTMAS ISLAND

BY

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IN a naturalist's eyes there is always a peculiar interest attaching to an oceanic island. For, owing to its isolation, we are able to obtain many clues to obscure points in the distribution and development of species, by investigating its fauna and flora.

In speaking of an oceanic island, I mean one which has, as far as we know, arisen by volcanic or other action from the sea, and is not merely a detached portion of an adjacent continent, or of a continent which has in lapse of time been destroyed. Under this category come most, if not all, of the chain of islands which lie scattered throughout the Atlantic Ocean far away from land, such as the Azores, Canaries, Madeira, Cape Verde, Fernando de Noronha, St. Paul's Rocks, Tristan d'Acunha, St. Helena, South Trinidad and Martin Vaz, the Crozets, Diego Garcia, and, farther East, Cocos and Christmas Islands. The plants and animals inhabiting nearly all these islands have now been pretty well explored, and good accounts, especially of the plants, have been published by various travellers and naturalists. Mr. HEMSLEY has collected all the work done on the botany of these islands, and added much thereto in the great work of "*The Voyage of the Challenger.*" One or two, however, remain to be more thoroughly examined, as at present but little is known of them. These are South Trinidad and its companion Martin Vaz lying off the coast of Brazil, and Christmas Island, now a British Colony attached to the Straits Settlements.

Christmas Island was visited by H. M. S. *Flying Fish* in 1887, and by H. M. S. *Egeria* in the year 1888, and Mr. J. J. LISTER, who remained on the island for a week, made considerable collections of the plants and animals there, accounts of which were published in the Journals of the Linnean and Zoological Society. Much, however, remains to be done, and it was with great pleasure that I found myself last August in H. M. S. *Redpole* bound for Christmas Island. Unfortunately the vessel was only able to remain there for the inside of one day, so that I could not get more than a glimpse of its flora and fauna. Many of the trees and shrubs were out of flower at that time too, so that I was unable to get specimens of them. I managed, however, to make several additions to the list of plants published by Mr. HEMSLEY from Mr. LISTER'S collections. Among the most interesting of which was a very pretty new orchid, *Saccolabium archytas*.

Viewed from the sea, near Flying Fish Cove, the island appeared as a long straight ridge rising abruptly from the sea, and densely covered with high forest, the deep green of which is dotted with white specks—the innumerable nesting sea-fowl—while here and there are orange-red patches of the bloom of a handsome coral-tree (*Erythrina*).

The whole island is about nine miles across, and its highest point is nearly 1,200 feet above sea level. The cliffs are mostly abrupt, but in some places are patches of beach, composed of broken coral, shells and stones. The surrounding seas are very deep, and there are but few spots shallow enough for anchorage of a large ship.

On the beach at Flying Fish Cove, Mr. ANDREW ROSS has established his little colony, at present consisting of 15 persons, and is cultivating coffee, coco-nuts and vegetables, for which purpose the brown soil saturated with guano is well suited.

The core of the island is said to be composed of volcanic rock, and I saw a few pebbles on the beach consisting of some kind of trap, but though I ascended to the top of the ridge, I saw none of the rock *in situ*. The whole island is covered with coral-limestone, a hard yellowish rock emitting a ringing sound when struck. In many places it occurs in the form of

cliffs rising one above the other, shewing that the island has been slowly and gradually elevated from the sea bottom. Where the upper surface is exposed it weathers into pinnacles and curiously shaped angular projections, and though weathering externally into holes, the inner portions are usually homogeneous. I did not see any fossils in it, but the distinguishable remains of shells and coral would probably be found, if sought for.

Exactly similar rock occurs in Fernando de Noronha, an island lying off the East coast of Brazil, which I visited in 1887, and with which Christmas Island has many points in common. This coral rock has been described by Mr. BRANNER in some notes on the petrology of Fernando de Noronha, published lately in the American Journal of Science as being derived from sand-dunes hardened by carbonate of lime. He shows, however, by analysis that it consists almost entirely of carbonate of lime with a very small proportion of silica which would at once negative that suggestion. Furthermore, it was quite easy to find at Fernando de Noronha spots where the coral-reef, which was still growing at the outer edge in the sea, passed into the compact ringing rock with no distinguishable organic remains in it. It is true that on Fernando de Noronha there are sand-dunes which might, and indeed had in one place, become hardened more or less into rock, not much resembling, however, the limestone, but in Christmas Island there is no level place on which could develop sand-dunes sufficiently extensive to form the immense mass of rock of which the greater portion of the island consists.

On our return from Christmas Island to Singapore we stopped for an hour or two at Anjer Point in Java, opposite the volcanic island Krakatau, of which so large a portion was destroyed by an eruption a few years ago. Anjer Point was then struck by an enormous wave which overthrew the light-house and caused a great loss of life. On the shore near the remains of the old light-house are some very large blocks of stone which, I was informed, were thrown up there from Krakatau, when in eruption. However, on examining them, I found they were masses of ordinary coral reef, which were probably thrown up from the sea by the large wave. They were

quite of the same nature as the Christmas Island rock as far as I could make out, but the organic remains were plainly visible and the rock less compact.

The soil which covers the rock beds in the forest is powdery, and dark brown, strongly impregnated with guano from the droppings of the numerous sea birds nesting upon the trees very similar to that of Fernando de Noronha. The forest is composed of a large variety of trees, many of very large size and producing good timbers, among them was the Gayam (*Inocarpus edulis*), species of *Eugenia* and *Ficus*, *Sideroxylon sundaicum*, an *Erythrina* with very small but brilliant orange flowers, and several other kinds of which I was unable to procure enough material to identify. The trees are clothed with ferns of several species, orchids and a wax-plant (*Hoya Aldrichii*, Hemsl.) which is called by the colonists the Flower of Paradise, from its beauty. It is very abundant, but I saw no trace of fruit or flowers, and had to content myself with bringing home some living plants. The orchids were abundant, too, the most common being a new species to which I have given the name of *Saccolabium archytas*. It has thick bright green leaves and long racemes of small white flowers spotted with pink. Besides these there was a *Dendrobium* of the *Cadetia* section, *D. crumenatum*, the well-known pigeon-orchid, a curious new species of *Sarcochilus* and what appeared to be one of the *Phreatias* described from LISTER'S collection by Mr. ROLFE. None of these latter were in flower at the time of my visit, but I secured live plants, and the *Sarcochilus* has since flowered in Singapore.

The pigeon-orchid is one of the most widely distributed of tree orchids in the East Indian region, and I was much surprised to pass a large number of plants apparently of this species quite fresh and green floating in the sea between Singapore and Batavia. One does not imagine that so delicate a plant as an orchid could survive prolonged immersion in the sea.

Terrestrial orchids were represented by *Corymbis veratrifolia*, Bl., also a very widely distributed species occurring in Western Africa, Assam, all over the Malay Peninsula and on the Malay Archipelago. It is true that BLUME in his "Or-

chids of the Indian Archipelago" distinguishes the African, Assamese and Malayan plants as three distinct plants, but the distinguishing characters appear to me too slight, especially as the plant is evidently a very variable one. I recently found specimens in Pulau Ubin near Singapore which were quite indistinguishable from some of the African forms.

Ferns are very abundant. Mr. LISTER collected fifteen species, two of which, viz., an *Asplenium* and an *Acrostichum* were new to science. The ground beneath the bigger trees in the forest produced many shrubs and small plants, among which were *Anisomeles ovata*, a large straggling herb with purple flowers like a large dead nettle; and another horehound-like Labiate with white flowers, a shrubby species of *Achyranthes*, *Ehretia buxifolia*, *Laportea crenulata*, Gaud., a tree nettle with stinging petioles, clumps of *Pandani*, *Oplismenus compositus*, *Fleurya æstuans*, and other plants. A *Randia*, perhaps of an undescribed species, formed coffee-like bushes with small white flowers and orange berries. It is evidently allied to *R. densiflora* which is also stated to occur here, but entirely different from that species in its smaller size of parts and habit. *Ochrosia Ackeringæ*, Miq., is a small *Apocynaceous* tree with white flowers and twin yellow fruits. In more open places near the shore were a tall Mallow (*Abutilon* sp.), with fairly large buff flowers, one of the common tree vines (*Leea sambucina*, L.) resembling an elder bush, and a scrambling bryony with small flowers (*Zehneria mucronata*, Miq.) and on the sandy spots by the shore were the common Waroo (*Hibiscus tiliaceus*), the goat's foot convolvulus (*Ipomea pes-capræ*), *Scævola Koenigii*, L., and *Ischoemum foliosum* Hack var. *leiophyllum*. This grass was identified for me by Professor HACKEL, who says, that this is a new variety differing from the type only in the glabrous leaves. This type is only known from New Caledonia.

The native palm (*Arenga Listeri*, Becc.) is plentiful, especially on the lower ground near the sea. It is a beautiful species about twenty feet in height with a stout green stem about four inches through, smooth except for the rings. The leaves are large, pinnate, light green above and glaucous beneath. The fruits resemble coffee-berries and are

bright red, each containing three seeds. They are peculiarly irritating even when handled like those of *Caryota urens* and *Kentia Macarthurii*. The tree produces a very excellent sago which is used as food by Mr. Ross' party. Indeed Christmas Island produces, for an island of its size, a remarkably large supply of natural vegetable and animal food, for besides the sago, there are plenty of Gayam (*Inocarpus edulis*) and Indian almonds (*Terminalia catappa*) both eatable and excellent fruits; while land crabs, pigeons and frigate birds supply plenty of animal food.

The birds of the island are somewhat interesting. A pretty brown ground thrush with a red abdomen was very abundant and tame, hopping about everywhere, and small green warblers (*Zosterops natalis*, Sharpe) flew about in little flocks and were very bold and fearless. A small brown hawk like a kestrel (*Urospizias natalis*, Sharpe) appeared on one occasion and fell to the gun. But the attraction to the party who landed from the *Redpole* lay in the pigeons, of which there were two species, one resembling the common green pigeon, the other a large blue dove, known as *Carphophaga Whartoni*, peculiar to this island. This is a very beautiful bird allied to the common Pergam (*C. ænea*), but of a rich deep blue colour. It is very abundant especially on the top of the hill, and towards sunset the woods resounded with its loud note. It sits high up in the lofty trees and is by no means easy to see. It is a very strong bird, several receiving four complete charges of shot before dropping and, like the common Pergam, is tough and not worth eating, but as an ornamental bird it has been successfully introduced into the Cocos Islands by Mr. Ross.

Of the marine birds, the Frigate Bird (*Fregata aquila*), tropic birds (*Phaethon flavirostris*) and boobies (*Sula piscatrix*) were very abundant nesting on the trees and filling the air with their fishy odour. The Frigate Bird is, we found, very good eating, having dark brown flesh with a good and not fishy flavour. Towards evening the great fox bats (*Pteropus natalis*, Thom.), began to appear and clung squeaking to the branches of the trees which were in fruit. They are quite different from the common fox bat, being entirely black. I saw

also a small insectivorous bat flying about, but could not catch it.

The native rats, *Mus Maclearii* and *M. nativitatis*, Thom., do not appear till dark, and as we left before sunset we could not secure any specimens. There are several kinds of lizards here, two of which I caught; one was a very dark, coloured gecko inhabiting the old stumps and rotten trees lying on the ground. As is constantly the case in islands and especially in oceanic islands there are no snakes here, though Mr. ROSS has seen, he tells me, their skeletons washed up on shore. But the most conspicuous denizens of the forest are the large blue and red land crabs (*Birgus latro*) which are exceedingly abundant living in holes in the ground, but constantly wandering about in the woods. Insects are not numerous. I noticed three species of butterfly, a yellow *Terias*, (*T. amplexa*) a *Hypolimnias* and what was probably the endemic species *Vadebra Maclearii*, but I could only get a single specimen of the first named species. Mr. ROSS presented me with a pair of very fine maroon-coloured hawkmoths, and told me that there was another and much finer kind to be met with of which he hoped to secure specimens. Of other insects I saw an abundant species of small red wasp, and a fine large *Buprestid* beetle, of a light but brilliant green colour glittering all over, and a large green larval mantis, too young to identify.

I append a list of all the animals and plants recorded, as far as I know, from the island, and hope that Mr. ROSS, who takes much interest in his insular home, will be enabled to assist us in getting a more complete idea of the fauna and flora of Christmas Island.

LIST OF ANIMALS AND PLANTS RECORDED FROM
CHRISTMAS ISLAND.

[NOTE :—In this list all endemic plants and animals are printed in italics. The (!) denotes that specimens were seen or gathered by myself, and the asterisk (*) marks those that have not previously been recorded.]

MAMMALS.

- * *Pteropus natalis*, Thomas. !
Small insectivorous bat. !
Crocidura fuliginosa var, *trichura*, Dobs.
Mus Maclearii, Thomas.
Mus nativitatis, Thomas.

BIRDS.

- * *Merula erythropleura*, Sharpe. !
Zosterops natalis, Sharpe. !
Collocalia natalis, Sharpe.
- * *Carpophaga Whartoni*, Sharpe. !
Chalcophaps natalis, Sharpe.
- * *Urospizias natalis*, Sharpe. !
Minox natalis, Sharpe.
- * *Ardea jugularis*, Forster. !
Charadrius Geoffroyi, Wagler.
Tringoides hypoleucus, L.
Phæthon phœnicurus, G. M.
Phæthon flavirostris, Brandt. !
- * *Fregata aquila*, L.
Sula piscatrix, L. !

REPTILES.

- Gymnodactylus marmoratus*, Kahl.
- Gecko Listeri*, Blgr.
- Lygosoma nativitatis*, Blgr.
- Ablepharus egeriæ*, Blgr.
- Typhlops exocæti*, Blgr.
- Chelonia virgata*.

LEPIDOPTERA.

- Vadebra Maclearii*, Butl.
Hypolimnias Listeri, Butl.
Nacaduba aluta, Butl.
* *Terias amplexa*, Butl.
Terias patruelis, Moore.
Porthesia irrorata, Butl.
Hydrillodes, sp.
Endragana limbata, Butl.
Sphingida, sp.
Pyrallis Listeri, Butl.
Boarmia compactaria, Walk.

COLEOPTERA.

- Morio orientalis*, Dejean.
Hololepta, sp.
Poederus, sp.
Paroegus Listeri, Gahan.
Leptaulax, sp.
Chrysodema simplex, Waterh.
Stigmatium, sp.
Muephilus, sp.
Hopatrum, sp.
Sessinia, 2 sp.
Ceresium nigrum, Gahan.

HEMIPTERA.

- Lygocus subrufescens*, Kirby.

HOMOPTERA.

- Oxypleura calipso*, Kirby.
Ricania flavicostalis, Kirby.
R. affinis, Kirby.
R. hyalina, Kirby.

DIPTERA.

- Laphria nigrocoerulea*, Kirby.
Stilbomyia jucunda, Kirby.

MYRIAPODA.

- Cryptops hortensis*, Leach.
Cryptops inermipes, Pocock.
Mecistocephalus castaneiceps, Haase.
Cylindrodesmus hirsutus, Pocock.
Spirostreplus exocoeti, Pocock.

ORTHOPTERA.

- Labidura nigricornis*, Kirby.
Blatta livida, Fabr.
Panesthia javanica, Serv.
Clitumnus stilpnoides.
A large larval Mantis.
Phisis Listeri, Kirby.
Gryllacris rufovaria, Kirby.
Prinnia orientalis, Kirby.
Cyrtacanthacris fusilinea, Walk.
C. disparilis, Kirby.
Epacromia rufostriata, Kirby.

HYMENOPTERA.

- Camponotus melichlornis*, Kirby, (Formicidæ).
Lobopelta diminuta, Kirby, (Poneridæ).
Odynerus polyphnemus, Kirby, (Eumenidæ).
Polistes belder, Kirby, (Vespidæ).

ARACHNIDA.

- Nephila nigritarsis*, Koch.
Homalattus auratus, Koch.
Heteropoda venataria, L.

CRUSTACEA.

- Hylococarcinus natalis*, Pocock.
Birgus latro, L.
Monchammus nativitatis, Gahan.
Praonethra perplexa, Gahan.
Micracantha, sp.

CRUSTACEA,—*Continued.*

Epilachum, sp.

Piezonotus discoidalis, Waterh.

MOLLUSCA.

Ariophanta Normani, Smith.*A. Mabelæ*, Smith.*A. Mildredæ*, Smith.*Succinea solidula*, Pfeiffer.*S. solitaria*, Smith.*S. Listeri*, Smith.*Pythia scaraboeus*, L.*Melampus luteus*, Quoy.*Melampus fasciatus*, Deshayes.*Truncatella valida*, Pfeiffer.*Leptopoma mouhoti*, Pfeiffer.

PLANTS.

DICOTYLEDONES.

Abutilon indicum var. ?* *A. sp.* !* *Hibiscus abelmoschus*, L. ! Near the Settlement.* *H. tiliaceus*. ! Common on the shores.*Vitis pedata*. !*Leea horrida*, Teysm.* *L. sambucina*, L. ! Near the shore.*Erythrina*, sp. ! Tall tree. Flowers small, scarlet orange.*Inocarpus edulis*, Forst.*Terminalia catappa*, L.*Eugenia*, sp.*Barringtonia racemosa*, Bl.*Pemphis acidula*, Forst.*Zehneria mucronata*, Miq. Near the shores.*Heptapleurum ellipticum*, Seem. !*Randia densiflora*, Benth.* *R. sp.* ! Bushes common near the Settlement.* *Psychotria*, sp. ! On the top of the ridge, small dark green bushes.*Blumea spectabilis*, Dec.

PLANTS,—*Continued.*

- * *Spilanthes acmella*, L. ! Near the huts.
- Scœvola Koenigii*. !
- Ardisia complanata*, Wall.
- Sideroxylon sundaicum*, Miq. ! A lofty tree near shore.
- Ochrosia Ackeringæ*, Miq. ! Small tree near shore.
- Hoya Aldrichii*, Hemsl ! Covering all the trees luxuriantly.
- Cordia subcordata*, Lam.
- Ehretia buxifolia*, Roxb.
- Tournefortia argentea*, Linn.
- * *Ipomea pescaprae*. ! Linn. Sea shore.
- Solanum biflorum*. ! Lour. !
- Datura alba*.
- Dicliptera Maclearii*, Hems.
- Anisomeles ovata*, R. B. L. In the woods, common.
- Callicarpa longifolia*, Lam.
- Tectona grandis*, Linn.
- Boerhaavia repanda*, Willd.
- Pisonia excelsa*, Bl.
- Achyranthes aspera*, L.
- * *A. sp.* ! A shrubby species near the shore in the woods.
- Deeringia celosioides*, R. Br.
- Peperomia*, sp.
- Hernandia ovigera*, L.
- Euphorbia hypericifolia*, L.
- Cleidion javanicum*, Bl.
- Macaranga tanarius*, Muell. Arg.
- Cudrania javanica*, Trec.
- Laportea crenulata*, Gaud. !
- Fleurya ruderalis*, Gaud. !

MONOCOTYLEDONES.

- * *Dendrobium crumenatum*, Lind. !
- * *D. (§ cadetia) sp.*
- Phreatia Listeri*, Rolfe.
- Ph. congesta*, Rolfe.
- * *Sarcochilus carinatifolius sp.* One plant only found.
- * *Saccolabium Archytas sp.* ! Very abundant.

MONOCOTYLEDONES,—*Continued.*

- * *Corymbis veratrifolia*, Bl. ! Top of the ridge.
- Arenga Listeri*, Becc. !
- Pandanus*, sp. Bushes near shore.
- Fimbristylis cymosa*, R. Br.
- * *Digitaria sanguinalis*, L. Near the Settlements.
- * *Oplismenus compositus*, Beauv. ! In the woods.
- Ischæmum muticum*, L.
- * *I. foliosum* var. *leiophyllum*, Hack. ! On the shore,
forming big tufts.
- * *Eleusine indica*, L. ! Near the Settlement.
- Eragrostis plumosa*, Lk.

FERNS.

Davallia solida, Sw.
D. dissecta, J. Sm.
Asplenium Nidus, L. !
A. falcatum, Lam. !
A. centrifugale, Bak.
Nephrodium truncatum, Presl.
N. syrmaticum, Bak.
Aspidium membranaceum, Hook.
Nephrolepis acuta, Presl.
N. ramosa, Moore.
Polypodium adnascens, Sw.
P. irioides, Lam.
Vittaria elongata, Sw. !
Acrostichum flagelliferum, Wall.
A. Listeri, Bak.

LYCOPODIACEÆ.

Lycopodium phlegmaria, L.

MOSESSES.

Neckera Lepineana, Mont.
Thyridium fasciculatum, Nutt.

HENATICÆ.

Ptychanthus squarrosus, Mont.

Lejeunia serpyllifolia, Lib.

LICHENS.

Usnea trichodea, Ach.

FUNGI.

Polyporus australis, Fr.

P. conchatus, Fr.

Stereum lobatum, Kze.

NEW SPECIES DESCRIBED.*Sarcochilus carinatifolius.*

Stem six inches long, flattened. Leaves fleshy oblong-elliptic slightly unequally bilobed blunt at the tip, bright green very strongly keeled especially at the base, two inches long one inch across; the base flattened laterally so as to form a broad flat petiole; sheath very deeply cleft on side opposite to lamina, when dry strongly ribbed. Scapes very graceful erect slender pale green about six inches long with one or two small sheathing bracts. Raceme of few flowers, opening one or two at a time, rachis thickened terete; bracts lanceate acute; green $\frac{1}{8}$ of an inch in length; flowers small thin textured, white withering buff; ovary and pedicel $\frac{1}{2}$ inch long, straight bright green. Posticous sepal lanceolate acuminate with recurved apex, laterals similar but the base prolonged below into an angle, keeled outside. Petals shorter linear lanceolate. Lip white base prolonged to form a blunt spur, lateral lobes very long narrow linear acuminate, midlobe shorter thick ovate blunt; a lorate raised ridge on the disc ending in a blunt rounded callus on the midlobe; a yellow spot on the base of the lip outside. Column straight thick with a distinct foot, clinandrium nearly flat, wings of column bent over the face,

foot linear upcurved. Another quadrate rounded at the top front edge truncate straight. Pollinia four unequal oval flattened with a small oval disc. Stigma deep oval; rostellum small.

A curious little plant, which bears no very distinct relation to any other species I know, but is probably an ally of *S. leopardinus*, Par., or at all events belongs to the section which includes this plant.

Saccolabium Archytas, nsp.

Stems short usually crowded in large masses with very many roots. Leaves lorate few, bright green, apices unequally bilobed, with blunt lobes, six inches long, by one broad. Racemes pendulous covered with small flowers, four to six inches long with a rather slender angled green rachis. Bracts short ovate acute. Flowers hardly $\frac{1}{2}$ inch across, opening a few at a time, ovary and pedicel $\frac{1}{2}$ inch long white, terete. Dorsal sepal narrow oblong obtuse boat-shaped, laterals obcuneate subtriangular. Petals spatulate with a broad obtuse apex, shorter than the sepals. All white. Lip small with side-lobes large and rounded white with violet spots, midlobe absent. Spur large straight dependent blunt. Column base narrow, above dilated, white with a violet face. Anther ovate acute in front, yellow. Pollen masses two globose pale yellow, pedicel linear rather broad, disc ovate. Capsule slender elongate three inches long, ribs not much elevated.

This is a pretty little plant although the flowers are so small. It is remarkable for the subtriangular sepals and the lip being reduced almost to a spur with the lateral lobes flanking the mouth.

SUMMARY.

The fauna and flora is typically Malayan as might be expected from the position of the island, and is evidently primarily derived from the coasts of Java which is the nearest land. Perhaps when the southern regions of Java are better worked out we shall find some of the peculiar Christmas Island species occurring there.

The greater part of the plants fall under one of the two heads, those whose seeds or fruits are carried about unharmed by sea currents, and those which having edible fruits are dispersed by birds. These in fact are the two methods by which most of the oceanic islands are populated. To the first class belong *Hibiscus tiliaceus*, *Inocarpus edulis*, *Terminalia Catappa*, *Barringtonia racemosa*, *Pemphis acidula*, *Ochrosia*, *Ackeringæ*, *Cordia subcordata*, *Tournefortia argentea*, *Ipomea pes capræ*, *Boerhaavia repanda*, *Hernandia ovigera*, *Pandanus*, sp., *Fimbristylis cymosa*, and probably also *Erythrina*, *Abutilon*, *Ehretia buxifolia* and *Tectona*. *Dendrobium crumenatum* and the other orchids may have been derived from plants drifted ashore on fallen trees.

As fruit-eating birds and bats are very numerous it is not to be wondered at that there are many species with edible fruits, which have been brought to the island by them. To this class belong *Vitis*, *Leea*, *Zehneria*, *Heptapleurum*, *Randia*, *Psychotria*, *Ardisia*, *Solanum*, *Callicarpa*, *Deeringia*, *Ficus*, *Didymosperma* and probably also *Eugenia*, *Sideroxylon*, *Euphorbia*, and *Cleidion*. The fruits of *Didymosperma* are as stated above very irritating but this is no bar to their being devoured by birds. The fruits of *Kentia Macarthurii*, a New Guinea palm, are nearly as irritating, but they are greedily eaten by the blue starlings in the Botanic Gardens, at Singapore and I found, in Fernando de Noronha, a species of *Sapium* which was so poisonous that the fruit falling on a horse would blister the skin, yet it was often eaten by small birds.

A few species have been introduced accidentally by man into Christmas Island, and this class will doubtless increase largely. Nearly all of these occur close to the Settlements. They include *Hibiscus Abelmoschus*, *Spilanthes*, *Datura*, *Achyranthes aspera*, *Eleusine*, *Digitaria* and perhaps *Abutilon indicum*. Such plants as *Pisonia excelsa* with its sticky fruits, *Achyranthes* sp. and *Oplismenus* may have been borne to the island by birds, as their fruits are more or less adhesive.

It might be imagined that winged or plumed seeds would be easily carried to distant islands and consequently form an important element in the flora. This is not so. In the majo-

rity of cases these seeds are carried a short way only and even if they were widely scattered by prolonged and violent winds, they would have but little chance of accidentally striking an island far off in the sea. To the class with plumed seeds belong *Hoya Aldrichii*, and *Blumea spectabilis*. Both may have been introduced by wind-currents.

Orchids are acknowledged to be rare in Oceanic Islands although their minute seeds are blown from the split capsules for a considerable distance. Perhaps that the Christmas Island species were in this manner drifted to their present home, but it is also possible that the epiphytic species were floated there on logs of fallen trees.

Ferns, the spores of which are produced in enormous quantities and are exceedingly light, are certainly widely scattered by the blowing of their spores to long distances, and the same remark applies to Fungi, Mosses and other Cellular Cryptogams.

LIST OF PAPERS PUBLISHED ON CHRISTMAS ISLAND.

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